Remarks/Arguments

Claims 1-35 are in the application. Claims 1, 8, 10, 11, 20, 22, 23, 26, 27, 29, and 35 are in independent form. Claims 1-7, 10-13, 22, and 27 are allowed. Claims 14-19, 25, 30, and 31 are objected to as being dependent upon rejected base claims, but would be allowable if rewritten into independent form including all limitations of the base claim and any intervening claims. Applicants thank the examiner for the indication of allowable subject matters.

Claims 8, 9, 20, 21, 23, 24, 26, 28, 29, and 32-35 stand rejected under 35 U.S.C. §103(a) for obviousness over US Pat. No. 6,114,695 to Todokoro et al. ("Todokoro").

Regarding claim 8, the Examiner states that Todokoro teaches a secondary electron optical system for collecting Auger electrons through the objective lens, and a detector/analyzer (124) for analyzing the Auger electrons. Applicants submit that electron detector 124 is not "an electron energy analyzer" as claimed and therefore cannot analyze the energy of Auger electrons. "FIG. 16 shows an example where reflection electrons and secondary electrons are both detected. An attraction electrode 16 is provided which passes through the center of an objective lens 7. Secondary electrons 5 generated by the reflection electrons from a specimen 8 are drawn into a magnetic field of the objective lens 7 and pulled upwards by means of the attraction electrode 16. The secondary electron 5 thus pulled upwards are accelerated by an attraction electric field 9 formed by a scintillator 10 so as to impinge on the scintillator 10 and cause it to luminesce." Col. 13, lines 21-30. Thus, the secondary electrons indiscriminately impinge on scintillator 10 and are not separated by energy.

Moreover, an Auger analysis would be inconsistent with the main point of Todokoro. In Auger analysis, the energies of the Auger electrons are indicative of the types of atom from which the electrons are emitted. Todokoro teaches that secondary electrons do not readily escape from the bottom of a high aspect ratio hole. (Electrons 2, FIG. 1) Todokoro solves the problem by using a high energy primary electron beam, which causes high energy reflection electrons that can penetrate through the sides of the hole and out the substrate, emitting secondary electrons from the surface as they break

through away from the hole. The secondary electrons and any Auger electrons electron emitted at the surface thus are not emitted from the material at the bottom of the hole and cannot be used in Auger analysis to determine materials at the bottom of the hole. Moreover, Auger analysis is useful because the energy of Auger electrons emitted from a surface are characteristic of the material. By determining the electron energy, one can determine the material present. Any Auger electron emitted at the bottom of the hole and penetrating through the side walls will have lost energy through collisions before reaching the surface, and so the energy of the electron will not longer correlate directly to the type of material.

Thus, not only does Todokoro not teach an energy analyzer for analyzing Auger electrons, there would be no incentive to add an energy analyzer to Todokoro because, even if any Auger electrons escape from the bottom of the high aspect ratio hole, their energy would not correlate to the material.

Regarding claim 9, the Examiner states that Todokoro teaches a shield (35) at col. 14, lines14-22 and FIG. 18. Todokoro teaches that the acceleration electrode is shielded. Claim 9 recites that the "the deflector produces a field for deflecting the Auger electrons and further comprising a shield that shields the primary beam from the field." In FIGS. 16 and 17 shows that the primary beam 4 is not shielded from the electric field 9 that deflects secondary electrons toward detector 10.

Amended claim 20 recites that the primary electrons have energies of between 3 keV and 30 keV. Todokoro teaches using a high energy primary beam of 50 keV or more to produce reflection electrons that have sufficient energy to penetrate the sides of holes and emerge from the surface. "The present inventors have found that phenomena as below take place in observation of such a specimen as a semiconductor device conducted using, as a particle beam, a high-energy scanning electron beam of 50 keV or more." Col. 5, lines 64-67. Todokoro's high energy primary beam is deflected less by his deflection field 9 than a lower energy primary beam would be. As described in applicants' specification, paragraph 1012, using an electric field to deflection of the secondary electrons away from the primary beam tends to distort the primary beam and degrade resolution unless the primary beam energy is significantly greater than that of the

secondary electrons. Applicants submit that claim 21 is patentable for at least the same reasons as its parent claim 20.

Similarly, claim 32 recites a beam energy of between 3 keV and 30 keV and applicants submit claim 32 is patentable for the same reason as described with respect to claim 20.

Applicants submit that claim 23 is patentable for the reasons describe above with respect to claim 8, and claim 24 is patentable for at least the reasons describe above with respect to its parent, claim 23.

Regarding claim 26 and 33, paragraph 1039 describes that Auger electrons are emitted isotropically and can be said to form a virtual Auger source. The isotropically electrons emitted are then re-converged to form an image of this virtual source, similar to the way light emitted from an object is focused to form an image of the object.

This is different from SEM imaging, in which an image of the entire surface is formed point by point by detecting the number of secondary electrons emitted from each point and using that number to determine the brightness of that point on an image. Forming an image of the virtual Auger means converging the electrons to form an electron image.

Because there are relatively few Auger electrons among the secondary electrons, and because an energy analyzer typically disperses the electrons on the basis of energy, forming an electron image of the Auger source ensures that a sufficient number of Auger electrons of various energies enter the detector for detection. Todokoro FIG. 21 shows that secondary electrons 105b impinge on detector 124, but does not show forming an image of a virtual Auger source, as for example, is shown in applicants' FIG. 3, reference number 90.

Applicants submit that claim 28 is patentable at least for the reasons describe above with respect to its parent claim 26.

Amended claim 29 recites an energy analyzer and applicants submit claim 29 is patentable for the reasons described with respect to claim 8.

Claim 34 recites an optical element that focuses the secondary electrons near the entrance of the energy analyzer. Todokoro does not include an energy analyzer and does not appear to focus the secondary electrons.

With regard to claim 35, Todokoro does not teach an energy analyzer.

Applicants respectfully request that the rejection be reconsidered and the application allowed.

Respectfully submitted,

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